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RESEARCH ARTICLE

Access to Care

Time Is Money: Opportunity Cost and Physicians' Provision of Charity Care 1996–2005

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Objective. To test whether physicians' provision of charity care depends on their hourly wage.
Data Sources. Secondary data from four rounds of the Community Tracking Study (CTS) Physician Survey (1996–2005). Data are nationally representative of nonfederal office- and hospital-based physicians spending at least 20 hours per week on patient care.
Study Design. A two-part model with site-level fixed effects, time trend variables, and site–year interactions is used to model the relationship between physicians' hourly wage and both their decision to provide any charity care and the amount of charity care provided. Salaried and nonsalaried physicians are modeled separately.
Data Collection/Extraction Methods. Data from each round of the CTS were merged into a single cross-sectional file with 38,087 physician-year observations.
Principal Findings. The association between physician's hourly wage and the likelihood of providing charity care is positive for salaried physicians and negative for nonsalaried physicians. Among physicians providing any charity care, hourly wage is positively associated with the amount of charity care provided regardless of salaried status. Practice characteristics are also significant.
Conclusions. The financial considerations of salaried physicians differ significantly from those of nonsalaried physicians in the decision to provide charity care, but factor similarly into the amount of charity care provided.

Key Words. Charity care, physicians, wages, opportunity cost

In the fragmented U.S. health care system, charity care is a crucial source of health care for the uninsured, with private practice physicians—due primarily to the sheer size of the workforce—providing upwards of 80 percent of all of the care delivered to the nation's uninsured (Blumenthal and Rizzo 1991; Fairbrother et al. 2003). However, as the number of uninsured persons has

grown over time, the percentage of physicians providing charity care nationwide has decreased from 76.3 percent in 1996 to 68.2 percent in 2005. The decrease has been observed across all geographic regions, physician specialties, and both urban and rural areas, making it increasingly likely that the uninsured are going without medical care or are increasingly clustered among fewer physicians (Cunningham and May 2006).

With the current downturn in the economy, more and more persons are losing their health coverage, and still others are underinsured. Consequently, tens of millions of individuals rely on some form of charity care. While the recent passage of health reform proposes to cover most of the nation's uninsured, the fact remains that not everyone will be covered, and the problem of underinsurance is likely to persist. Therefore, it is important from a policy perspective to understand what factors, if any, are influential in a physician's decision to provide charity care, and to determine the amount of charity care provided.

While a number of studies have been conducted to understand the personal motivations physicians have in choosing specialties and/or practice locations that involve caring for large proportions of underserved patients, few studies have looked closely at the physician population as a whole to assess the influence of economic factors on charity care provision (Li, Williams, and Scammon 1994; Miller, Hooker, and Mains 2006; Curlin et al. 2007). Accounting for inflation, physicians' real income has decreased by 7.1 percent over the last decade, and this may explain physicians' reluctance to provide charity care (Tu and Ginsburg 2006). Physicians may choose to forego providing charity care because of concerns about the extent of care required by underserved populations, financial constraints, malpractice fears, and the high costs of follow-up care (Holleman et al. 1991).

Cunningham and Hadley (2008) published a study that examined the effect of changes in physician income on physicians' decision to start or stop providing charity care. The authors found that both large positive and large negative changes in income were associated with physicians choosing to begin providing charity care. Cunningham and Hadley focus on physicians' decision to provide charity care and ignore the amount of charity care provided, because "... the decision to provide any charity differs in important ways from the decision on the quantity of charity care, ... [and] trend data from the CTS show that the proportion of physicians providing charity care has declined in

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the past ten years, but that the average number of charity care hours for those who offer any care has remained relatively stable" (pp. 101–102).

By contrast, this study considers the effect of hourly wage—rather than total income—on both the physician's decision to provide any charity care, and—conditional on providing any charity care—the amount of charity care provided. It also makes a new contribution by modeling charity care provision separately among salaried and nonsalaried physicians. Analyzing the data in pooled cross-sectional form permits unobserved general time trends, unobserved time-invariant differences between study sites, and unobserved time-varying differences between study sites to be controlled for while assessing potential differences in the effect of hourly wage on charity care over time.

Conceptual Model

Given the nature of time as a limited resource, physicians must make decisions about how many patients they will see each day and how much time they will spend with each patient. According to Becker's (1965) theory of full cost, the decision to provide charity care is, in some sense, the decision not only to provide services without charge, but also to forego earning income by treating a paying patient. In return, these costs may be offset by the personal benefit the physician perceives from providing a charitable service. As the amount of potential income foregone increases, the opportunity cost of the physician's time increases, and the decision to provide charity care becomes more costly, *ceteris paribus*. Previous studies have tested this hypothesis with mixed results (Culler and Ohsfeldt 1986; Emmons and Rizzo 1993).

Conversely, the target income hypothesis suggests that hourly wage is important only insofar as it relates to a physician's total income (Rizzo and Blumenthal 1996). Physicians with higher total wages are likely to be more financially secure at the margin and will, in turn, be more likely to afford to provide charity care. While the amount of the target income varies across individuals, the higher the hourly wage, the sooner the target will be reached, leaving more posttarget time available with which to provide charity care.

In this study, I explore the association between the opportunity cost of physicians' time and their provision of charity care. Specifically, I test the hypothesis that the higher the opportunity cost of the physician's time (as measured by hourly wage), the less likely the physician will be to provide any charity care, and conditional on providing any charity care, hourly wage will be negatively associated with the amount of charity care provided. Because

salaried physicians are not paid on a fee-for-service basis like nonsalaried physicians, their effective hourly wage may have a differential effect on their provision of charity care. Thus, I model salaried and nonsalaried physicians separately. Additionally, I hypothesize that as physicians have faced increased financial pressures over time, the magnitude of the wage effect will become increasingly negative.

DATA

This study uses data from the Community Tracking Study's (CTS) Physician Survey sponsored by the Robert Wood Johnson Foundation and conducted by the Center for Studying Health System Change. The survey, which is conducted to better understand how health care delivery in the United States is changing over time, uses the American Medical Association and American Osteopathic Association master files to sample active nonfederal office- and hospital-based physicians practicing a minimum of 20 hours per week in direct patient care. Residents and fellows are excluded.

I combined the restricted-use data files for 1996–1997, 1998–1999, 2000–2001, and 2004–2005 to generate a pooled cross-sectional dataset. There were 12,528 physicians surveyed during year 1 of the study, 12,304 physicians surveyed during year 2, 12,406 physicians surveyed during year 3, and 6,628 physicians surveyed during year 4, for a total of 43,866 physician-year observations in the initial pooled sample. After excluding a supplemental national random sample for which site identifiers were not available, 38,826 observations remained.

The dependent variable of interest in this study, hours of charity care, is a continuous variable defined as the number of hours in the past month that the physician provided free or reduced fee health care (excluding discounted fee-for-service) to a patient because of the patient's financial need. It does not include time spent providing services for which the physician expected but did not receive payment (i.e., bad debt).

The key independent variable of interest in this study is physicians' hourly wage. This variable was constructed by dividing physicians' total annual income from the practice of medicine by the total number of medically related hours worked in the last year, excluding charity care as follows:

$$\text{Hourly wage} = \text{income}/[(\text{weeks worked last year} \times \text{hours worked last week}) - (\text{hours of charity care last month} \times 12)]$$

An alternate construction of hourly wage is discussed in the limitations.

All dollar figures were adjusted for inflation using the Consumer Price Index and are reported using 2005 dollars. Physician's income in the CTS is defined as net income in the previous year, reported to the nearest U.S.$1,000 and top coded at U.S.$400,000. A total of 1,575 observations (4.1 percent) were top coded. This should have a minimal impact on the construction of the hourly wage variable. To capture nonlinear effects of hourly wage on the provision of charity care, hourly wage squared is included. The percent of physician's income from managed care and percent of physician's income from Medicaid are included. Similarly, control variables are included for percent of physician's income from capitated sources and percent of physician's income from Medicare. These revenue categories are not mutually exclusive (e.g., Medicaid managed care). In addition to the percent of physician's income from managed care, a variable for the number of managed care contracts a physician has is also included. To gauge the impact of managed care restrictions, a variable defined by level of agreement with the question "I can make clinical decisions in the best interests of my patients without the possibility of reducing my income" is included.

Other factors previously identified as being associated with either the likelihood of providing charity care or the amount of charity care provided are also controlled for in the model. These include ownership of practice, practice type, physician specialty, allopathic or osteopathic physician, and physician age, gender, and years of practice experience (Ohsfeldt 1985; Blumenthal and Rizzo 1991). In particular, practice ownership is included because those who own their practice are free to decide how to allocate their time and thus may provide more charity care, while those who are employees of a practice are less autonomous (Reed, Cunningham, and Stoddard 2001).

Physician age and years of practice are calculated by subtracting the year of birth and the year in which the physician began practicing medicine, respectively, from the year in which the survey was administered. After careful consideration, age was dropped from the model because it was highly correlated with years of practice (0.94) and no additional explanations for the effect of age on the provision of charity care beyond years of practice were intuitively apparent. Additionally, a test of functional form found that the effect of years of practice was nonlinear and significant. Thus, a variable years of practice squared is also included in the model.

Because the J-1 Visa Program permits foreign medical graduates entry to the United States to practice in underserved areas, and because the demand for charity care is greater in these areas, a positive association between foreign medical graduate status and the provision of charity care seems likely and is

controlled for. Then, because the pooled data come from four different study years, three time dummies are included in the model. These variables allow the intercept to shift over time, capturing any time trends in the provision of charity care not accounted for elsewhere in the model. Lastly, to capture differences in the effect of physician wage on charity care over time, the wage variable is interacted with each of the time dummies.

T-tests of summary statistics between observations with and without missing data did not reveal systematic differences in missing data. Therefore, I decided to use complete case analysis. Starting with the 38,826 physician-year sample, I dropped individual observations with noninstructive or impossible values for the following variables (number of observations dropped in parentheses): hours of charity care >744 per month (1), missing data on whether physician is salaried (80), fewer than 0 or more than 52 weeks of work in the last year (68), negative years of practice (1), hourly wage missing or <0 (104), physician did not know or refused to answer if they face financial disincentives (450), income not ascertained (26), international medical graduate not ascertained (9). After these adjustments, 38,087 individuals remained in the sample.

METHODS

The summary statistics indicate that 28.7 percent of the sample (physician-year observations) reported providing no charity care. Furthermore, physicians providing some charity care differ significantly from physicians providing no charity care (see Table 1). In this case, a two-part model is appropriate. The first part of the model uses probit estimation to predict the probability of a physician providing any charity care (hours of charity care >0) as a function of the independent variables including controls for site and site $\times$ year interactions, while the second part of the model uses linear regression to predict the amount of charity care a physician provides as a function of the same independent variables, conditional on providing at least some charity care.

In both the first and second parts of the two-part model, coefficient estimates may be biased because of unobserved differences in the physician's practice area. Specifically, differences in the likelihood or level of charity care provision may vary according to the number of uninsured persons, unemployment rate, the availability of safety net facilities, the level of HMO penetration, the cost of living, and the average cost for a physician office visit

Table 1: Physician Summary Statistics by Provision of Charity Care

Variable	*No Charity Care Provided*	*At Least Some Charity Care Provided*
Hourly wage for medical work (U.S.$ per hour)	77.55	82.68**
% Salaried	64.66	47.66**
% Without financial disincentives	81.12	73.38**
Number of managed care contracts	11.05	12.32**
Source of revenue		
% Revenue from managed care	49.65	44.11**
% Revenue from Medicaid	16.40	14.25**
% Revenue from Medicare	27.70	30.10**
% Revenue from capitation	24.82	16.99**
Years of practice	16.36	16.35
% Female	29.94	21.88**
Age	48.43	48.67*
% Osteopathic physicians (D. O.)	7.16	7.78*
Physician specialty		
% Surgical specialty	4.80	9.09**
% General surgery	1.67	3.12**
% Primary care	64.47	58.99**
% Emergency medicine	7.08	2.34**
% Mental health/substance abuse	3.89	4.80**
% OBGYN	3.70	4.12*
% Hematology and oncology	0.99	1.31**
% All other specialties	13.40	16.23**
% Foreign medical graduates	19.49	21.20**
Practice ownership		
% Full owners of practice	20.34	37.59**
% Part owners of practice	18.18	24.10**
Physician practice type		
% In group practice	23.89	29.22**
% In group HMO	11.52	3.32**
% In medical school practice	10.00	7.06**
% In hospital-based practice	16.21	11.06**
% In other practice type	13.82	8.17**
Weeks worked in last year	46.78	47.55**
Medically related work hours in last week	49.23	55.26**
Total number of observations	10,938	27,149

Note. Results of *t*-tests for differences between groups: *$p < .05$; **$p < .01$.

between sites and over time (Baxter and Mechanic 1997). Using sample site identifiers available in the CTS, however, it is possible to control for these differences between study sites using a random-effects or fixed-effects model.

Several specification tests were conducted to identify the correct model. These and all other analyses were conducted using *Stata 10* (Stata Corp 2008).

For the first part of the model, the results of a Wald test indicated that the site level fixed effects ($\chi^2(59) = 433.94$, $p = .0000$) and the site–year interactions ($\chi^2(176) = 404.78$, $p = .0000$) were jointly significant and should be included. For the second part, after running a fixed-effects model, an *F*-test on the site level fixed effects found that these variables were jointly significant ($F(59, 26{,}950) = 1.54$, $p = .0050$), suggesting that fixed effects is preferred to pooled OLS. After running a random-effects model, the results of a Breusch–Pagan test ($\chi^2(1) = 5.51$, $p = .0189$) suggested that random effects is preferred to pooled OLS, because unobserved variation in the error term biased the OLS coefficients. A Hausman test rejected the null hypothesis of no systematic differences between the two sets of coefficients ($\chi^2(199) = 90.82$, $p = .0065$), indicating that fixed effects is both consistent and efficient, and therefore is preferred over the inconsistent random-effects model.

Therefore, to control for unobserved time-invariant geographic variation, a fixed-effects dummy variable is included for each of the 60 sites sampled in the CTS Physician Survey. These variables capture variation between survey sites, but they cannot account for variation at a lower level within a site (e.g., neighborhood) (Cunningham et al. 1999). It is also likely that time-varying characteristics (e.g., the uninsurance and unemployment rates) will change differently across the sites, and these relationships might prove of interest. Thus, site–year interactions are included in the model to control for these unobserved site-specific time-varying effects as suggested by LoSasso and Buchmueller (2002).

Before finalizing the model, tests for functional form of the dependant variable were conducted, because it was thought that the distribution of charity care might be skewed. The results of a Box–Cox test rejected all null hypotheses and were inconclusive. The results of a Wooldridge test (nonlogged $R^2 = 0.1049$, logged Wooldridge pseudo-R^2 statistic = 0.0875) indicated that a nonlogged form of the dependent variable is preferred. Thus, the correct specification is a fixed-effects model with a nonlogged dependent variable.

The final model is shown below, where α and δ are constant terms, X is a vector of physician and practice characteristics (hourly wage and its square, physician specialty, osteopath, female, foreign medical graduate, years of practice and its square, practice type, practice ownership, source of physician revenue, number of managed care contracts, and the presence/absence of financial disincentives to practice style), T is a vector of time dummies to control for general time trends, $(T \times \mu)$ is a vector of site–year interactions to control for unobserved site-specific time-varying variables, and μ is a vector

of fixed-effects dummy variables to control for site-specific time-invariant variables:

First part

$$\Pr(\text{Hours of Charity Care} > 0)_{ist} = \alpha_i + \beta_i X_i + \gamma_t T_t + \eta_{st}(T \times \mu)_{st} + \psi_s \mu_s + \varepsilon_{it}$$

Second part

$$(\text{Hours of Charity Care} | \text{Hours of Charity Care} > 0)_{ist} = \delta_i + \gamma_i X_i + \pi_t T_t + \rho_{st}(T \times \mu)_{st} + \theta_s \mu_s + \varepsilon_{it}$$

Because the financial incentives to physicians differ according to whether they are paid a fixed salary, stratified analyses are conducted among salaried and nonsalaried physicians. While practice owners were not asked about whether they were salaried, they are treated as nonsalaried for the purposes of this analysis. Regressing the squared residuals from the fixed-effects model on the independent variables indicated heteroskedasticity, so robust standard errors were used. Finally, a series of *F*-tests were performed to test for the joint significance of certain constructs in the model.

RESULTS

The mean amount of charity care provided in the past month by physicians providing at least some charity care was 10.7 hours and their average hourly wage was U.S.$82.68. From 1996 to 2005, the probability of a physician providing any charity care declined by 15.2 percent for salaried physicians, but it did not change for nonsalaried physicians (despite a temporary 11 percent decrease in 2001) as shown in Table 2. Across the sample, the average marginal and incremental effects of several variables on the probability of providing any charity care can be calculated for salaried and nonsalaried physicians. Of primary interest in this study, the association between hourly wage and the likelihood of charity care provision is found to be significantly positive for salaried physicians and significantly negative for nonsalaried physicians, though the effects are small. Specifically, a U.S.$100 increase in hourly wage is associated with a 2.8 percent increase in the likelihood of providing charity care for salaried physicians, and a 3.5 percent *decrease* in the likelihood of providing charity care for nonsalaried physicians. Interactions of hourly wage and year dummies did not indicate any clear trends in the relationship between hourly wage and the likelihood of providing any charity care over time.

Certain physician specialties are significantly associated with the likelihood of providing charity care. Practicing emergency medicine is associated

Table 2: Results of Probit Model to Predict Probability of Providing Any Charity Care

	Pr (Hours of Charity Care > 0)			
	Nonsalaried Physicians		*Salaried Physicians*	
Coefficient	*With Wage–Year Interactions*	*Without Wage–Year Interactions*	*With Wage–Year Interactions*	*Without Wage–Year Interactions*
Constant	0.924**	0.871**	0.801**	0.772**
	(0.134)	(0.132)	(0.102)	(0.0995)
Physician's hourly wage	−0.000962*	−0.000199	0.000898*	0.00131**
	(0.000387)	(0.000244)	(0.000416)	(0.000253)
Physician's hourly wage^2	3.03e−07	1.26e−07	−2.25e−07	−3.16e−07*
	(2.17e−07)	(1.60e−07)	(2.21e−07)	(1.48e−07)
Physician's hourly wage × (1998–1999)	−0.00111	—	0.000198	—
	(0.00118)	—	(0.000636)	—
Physician's hourly wage × (2000–2001)	0.00203**	—	0.000560	—
	(0.000643)	—	(0.000758)	—
Physician's hourly wage × (2004–2005)	−8.42e−05	—	0.00117	—
	(0.00126)	—	(0.000931)	—
Physician's hourly wage^2 × (1998–1999)	6.17e−06	—	1.28e−07	—
	(4.26e−06)	—	(5.47e−07)	—
Physician's hourly wage^2 × (2000–2001)	−1.13e−06*	—	2.28e−07	—
	(5.02e−07)	—	(1.21e−06)	—
Physician's hourly wage^2 × (2004–2005)	5.42e−06	—	−3.07e−07	—
	(4.55e−06)	—	(1.91e−06)	—
No financial disincentives	−0.0724	−0.0726	−0.0732	−0.0745
	(0.0562)	(0.0561)	(0.0512)	(0.0512)
Yes financial disincentives	0.0321	0.0305	0.171**	0.169**
	(0.0593)	(0.0592)	(0.0557)	(0.0557)
No. of managed care contracts	0.00342**	0.00341**	0.00276**	0.00277**
	(0.000923)	(0.000922)	(0.000711)	(0.000711)
Female	−0.149**	−0.149**	−0.153**	−0.153**
	(0.0293)	(0.0293)	(0.0223)	(0.0223)
Foreign medical graduate	0.136**	0.135**	−0.0370	−0.0363
	(0.0299)	(0.0299)	(0.0259)	(0.0259)
Osteopathic physician	0.0699	0.0671	0.0509	0.0507
	(0.0428)	(0.0427)	(0.0397)	(0.0397)
Practice ownership (nonowner omitted)				
Full owner of practice	0.348**	0.351**	0.516**	0.518**
	(0.0473)	(0.0472)	(0.0546)	(0.0545)
Part owner of practice	0.276**	0.279**	0.313**	0.313**
	(0.0464)	(0.0463)	(0.0308)	(0.0308)
Source of revenue				
% Capitated	−0.00138*	−0.00135*	−0.00221**	−0.00219**
	(0.000620)	(0.000620)	(0.000456)	(0.000456)

continued

Table 2: *Continued*

	Pr (Hours of Charity Care > 0)			
	Nonsalaried Physicians		*Salaried Physicians*	
Coefficient	*With Wage–Year Interactions*	*Without Wage–Year Interactions*	*With Wage–Year Interactions*	*Without Wage–Year Interactions*
% Managed care	−0.00112*	−0.00117*	−3.10e−06	1.65e−06
	(0.000525)	(0.000525)	(0.000457)	(0.000457)
% Medicaid	0.000974	0.000990	0.00135*	0.00133*
	(0.000777)	(0.000777)	(0.000523)	(0.000523)
% Medicare	0.000473	0.000456	0.00213**	0.00213**
	(0.000524)	(0.000524)	(0.000450)	(0.000449)
Physician practice type (solo/2 physician omitted)				
Group practice	−0.0162	−0.0187	−0.0862*	−0.0852*
	(0.0353)	(0.0353)	(0.0360)	(0.0360)
Group HMO	−0.526**	−0.526**	−0.671**	−0.670**
	(0.103)	(0.103)	(0.0473)	(0.0473)
Medical school	0.211	0.210	−0.165**	−0.164**
	(0.146)	(0.146)	(0.0424)	(0.0424)
Hospital based	−0.0667	−0.0678	−0.173**	−0.172**
	(0.0757)	(0.0757)	(0.0395)	(0.0394)
Other practice	−0.179**	−0.175**	−0.273**	−0.271**
	(0.0624)	(0.0623)	(0.0413)	(0.0412)
Physician specialty (other specialty omitted)				
Surgical specialty	0.0203	0.0134	0.209**	0.206**
	(0.0532)	(0.0531)	(0.0590)	(0.0589)
General surgery	0.113	0.112	−0.133	−0.132
	(0.0792)	(0.0791)	(0.0919)	(0.0919)
Primary care	−0.150**	−0.152**	−0.0242	−0.0253
	(0.0330)	(0.0328)	(0.0275)	(0.0275)
Emergency medicine	−0.896**	−0.897**	−0.641**	−0.639**
	(0.0613)	(0.0612)	(0.0526)	(0.0525)
Mental health/substance abuse	0.145*	0.142*	−0.00729	−0.00760
	(0.0595)	(0.0594)	(0.0555)	(0.0555)
OBGYN	−0.128*	−0.132*	−0.0200	−0.0219
	(0.0598)	(0.0598)	(0.0571)	(0.0571)
Hematology and oncology	0.226	0.227	0.0444	0.0453
	(0.127)	(0.127)	(0.0848)	(0.0848)
Study year dummies (1996–1997 omitted)				
1998–1999	0.138	0.0979	−0.285**	−0.270**
	(0.158)	(0.144)	(0.105)	(0.0946)
2000–2001	−0.354*	−0.213	−0.361**	−0.319**
	(0.146)	(0.139)	(0.110)	(0.0987)
2004–2005	0.0441	0.0795	−0.477**	−0.386**
	(0.210)	(0.198)	(0.141)	(0.127)

continued

Table 2: *Continued*

	Pr (Hours of Charity Care > 0)			
	Nonsalaried Physicians		*Salaried Physicians*	
Coefficient	*With Wage–Year Interactions*	*Without Wage–Year Interactions*	*With Wage–Year Interactions*	*Without Wage–Year Interactions*
Years of practice	−0.00262	−0.00270	−0.00167	−0.00173
	(0.00350)	(0.00349)	(0.00314)	(0.00313)
Years of practice^2	−0.000166*	−0.000162*	−0.000178*	−0.000176*
	(7.33e−05)	(7.30e−05)	(7.72e−05)	(7.71e−05)
Observations	18,063	18,063	20,012	20,012

Note. Standard errors in parentheses.
*$p<.05$; **$p<.01$.

with a 31.3 percent decrease in the likelihood of providing any charity care for nonsalaried physicians and a somewhat similar 21.4 percent decrease among salaried physicians, relative to a reference group of "other" specialists. Other specialty effects varied by salaried status. For instance, salaried surgical specialists are 5.9 percent more likely to provide charity care when compared with a reference group of "other" physician specialists, while no effect is observed among their nonsalaried peers. Among nonsalaried physicians, primary care physicians are 4.4 percent less likely and OBGYNs are 3.9 percent less likely than the reference group to provide any charity care, while mental health practitioners are 4.2 percent more likely to provide any charity care. Other statistically significant, but practically small associations are observed for revenue source and gender. For example, a change in income from 0 percent capitated revenue to 100 percent capitated revenue is associated with a 5.0 percent decrease in the probability of providing any charity care for nonsalaried physicians and a 7.0 percent decrease in the probability of providing any charity care for salaried physicians. Women are 4.7 percent less likely than men to provide some charity care if they are salaried and 4.5 percent less likely to do so if they are nonsalaried.

The magnitude of the associations between practice type and charity care provision is more substantial. Among salaried physicians, full owners are 14.9 percent more likely and part owners are 8.9 percent more likely than nonowners to provide charity care. Among nonsalaried physicians, the effects are slightly smaller at 10.1 and 7.9 percent, respectively. Salaried physicians in all other practice types are less likely to provide charity care when compared with solo or two-physician practices, but the greatest difference is seen among

physicians in-group HMOs, which are 22.6 percent less likely to provide charity care. For nonsalaried physicians, a 17.7 percent decrease in the likelihood is observed.

Conditional on providing at least some charity care, the final fixed-effect model with robust standard errors (Table 3) explains roughly 7 percent of the

Table 3: Physicians' Provision of Charity Care Conditional on Providing Any Charity Care

	Charity Care Hours			
	Nonsalaried Physicians		*Salaried Physicians*	
Coefficient	*With Wage–Year Interactions*	*Without Wage–Year Interactions*	*With Wage–Year Interactions*	*Without Wage–Year Interactions*
Constant	7.762**	6.466**	5.782**	6.326**
	(1.061)	(1.210)	(1.583)	(1.363)
Physician's hourly wage	0.0178**	0.0348**	0.116**	0.107**
	(0.00576)	(0.00804)	(0.0142)	(0.00996)
Physician's hourly wage^2	− 4.99e − 06**	− 4.91e − 06	− 3.35e − 05**	− 2.86e − 05**
	(1.61e − 06)	(3.87e − 06)	(6.31e − 06)	(5.26e − 06)
Physician's hourly wage × (1998–1999)	0.0177	—	0.00145	—
	(0.0189)	—	(0.0235)	—
Physician's hourly wage × (2000–2001)	0.00386	—	− 0.00483	—
	(0.0146)	—	(0.0239)	—
Physician's hourly wage × (2004–2005)	− 0.00410	—	− 0.0740**	—
	(0.0142)	—	(0.0239)	—
Physician's hourly wage^2 × (1998–1999)	2.99e − 06	—	8.69e − 06	—
	(6.63e − 06)	—	(8.32e − 06)	—
Physician's hourly wage^2 × (2000–2001)	4.00e − 05*	—	− 1.87e − 06	—
	(1.96e − 05)	—	(9.79e − 06)	—
Physician's hourly wage^2 × (2004–2005)	2.34e − 05**	—	8.39e − 05	—
	(6.31e − 06)	—	(5.45e − 05)	—
No financial disincentives	− 1.498*	− 1.773**	− 3.118**	− 3.115**
	(0.598)	(0.625)	(0.961)	(0.960)
Yes financial disincentives	− 0.176	− 0.433	− 1.952	− 1.963
	(0.631)	(0.653)	(1.008)	(1.007)
No. of managed care contracts	0.0102	0.00901	− 0.0194	− 0.0185
	(0.0104)	(0.0104)	(0.0113)	(0.0112)
Female	0.109	0.174	− 0.465	− 0.416
	(0.338)	(0.339)	(0.382)	(0.383)
Foreign medical graduate	0.698	0.669	− 0.0310	− 0.00950
	(0.366)	(0.370)	(0.440)	(0.440)

continued

Table 3: *Continued*

	Charity Care Hours			
	Nonsalaried Physicians		*Salaried Physicians*	
Coefficient	*With Wage–Year Interactions*	*Without Wage–Year Interactions*	*With Wage–Year Interactions*	*Without Wage–Year Interactions*
Osteopathic physician	0.227	0.218	0.401	0.444
	(0.450)	(0.451)	(0.590)	(0.589)
Practice ownership (nonowner omitted)				
Full owner of practice	0.903	0.965	−1.259*	−1.352*
	(0.545)	(0.548)	(0.565)	(0.568)
Part owner of practice	−0.0784	−0.0650	−1.212**	−1.223**
	(0.524)	(0.525)	(0.381)	(0.382)
Source of revenue				
% Capitated	−0.0156*	−0.0150*	−0.00782	−0.00880
	(0.00738)	(0.00755)	(0.00713)	(0.00714)
% Managed care	−0.0255**	−0.0261**	−0.0549**	−0.0556**
	(0.00646)	(0.00647)	(0.00831)	(0.00837)
% Medicaid	0.0786**	0.0793**	0.111**	0.111**
	(0.0106)	(0.0108)	(0.0110)	(0.0110)
% Medicare	0.00892	0.00917	0.00203	0.00203
	(0.00655)	(0.00651)	(0.00812)	(0.00813)
Physician practice type (solo/2 physician omitted)				
Group practice	−0.596	−0.707*	−0.373	−0.396
	(0.341)	(0.342)	(0.390)	(0.390)
Group HMO	0.352	0.284	1.167*	1.122
	(1.143)	(1.146)	(0.595)	(0.594)
Medical school	4.434*	4.453*	6.008**	5.992**
	(1.735)	(1.735)	(0.708)	(0.709)
Hospital based	−0.755	−0.905	1.160*	1.051*
	(0.830)	(0.833)	(0.527)	(0.527)
Other practice	2.499*	2.471*	5.855**	5.791**
	(0.998)	(1.005)	(0.662)	(0.662)
Physician specialty (other specialty omitted)				
Surgical specialty	2.296**	2.060**	3.593**	3.856**
	(0.617)	(0.619)	(1.012)	(1.011)
General surgery	6.644**	7.130**	3.472	3.373
	(1.141)	(1.170)	(1.824)	(1.831)
Primary care	0.354	0.576	0.141	0.287
	(0.393)	(0.406)	(0.460)	(0.465)
Emergency medicine	5.066**	5.165**	1.599	1.696
	(1.246)	(1.255)	(1.134)	(1.156)
Mental health/substance abuse	4.216**	4.284**	4.832**	4.827**
	(0.693)	(0.694)	(1.291)	(1.297)
OBGYN	0.112	0.101	0.833	1.007
	(0.606)	(0.605)	(0.914)	(0.910)

continued

Table 3: *Continued*

	Charity Care Hours			
	Nonsalaried Physicians		*Salaried Physicians*	
Coefficient	*With Wage–Year Interactions*	*Without Wage–Year Interactions*	*With Wage–Year Interactions*	*Without Wage–Year Interactions*
Hematology and oncology	−0.350	−0.405	2.552	2.620*
	(0.802)	(0.813)	(1.329)	(1.319)
Study year dummies (1996–1997 omitted)				
1998–1999	−1.722	−0.374	−0.188	−0.0303
	(1.834)	(1.122)	(2.081)	(1.340)
2000–2001	−0.431	0.184	0.877	0.486
	(1.756)	(1.597)	(1.998)	(1.501)
2004–2005	1.343	1.184	4.260	−1.101
	(1.917)	(1.633)	(2.353)	(1.996)
Years of practice	−0.0636	−0.0700	−0.357**	−0.348**
	(0.0398)	(0.0396)	(0.0571)	(0.0569)
Years of practice^2	0.00114	0.00132	0.00770**	0.00750**
	(0.000892)	(0.000888)	(0.00140)	(0.00139)
Observations	14,210	14,210	12,939	12,939
No. of Site × year interaction terms	180	180	180	180
No. of Site level variables	60	60	60	60
Adjusted R^2	0.074	0.065	0.163	0.160

Note. Standard errors in parentheses.
*$p<.05$; **$p<.01$.

variation in the provision of charity care for nonsalaried physicians and 16 percent for salaried physicians. Physicians' hourly wage is significantly associated with the amount of charity care provided, but the effect is nonlinear and roughly 6.5 times greater for salaried versus nonsalaried physicians. For the average salaried physician who provides some charity care and earns an hourly wage of U.S.$82.68, a U.S.$10 increase in hourly wage is associated with a 1.1 hours increase in charity care provided per month holding all else constant. This effect moves toward—but is unlikely ever to reach—zero as physician wage increases. For nonsalaried physicians, a U.S.$10 increase in hourly wage is associated with a 10.2 minutes increase in monthly charity care provision. Additionally, the interaction of hourly wage with each of the year dummies failed to yield jointly significant coefficients, suggesting that the effect of wage on the amount of charity care provided has not changed during the study period.

Percentages of physician's revenue from managed care and Medicaid were statistically, but not practically, significant. Each percentage point increase in managed care revenue is associated with a 0.026 hour decrease for nonsalaried physicians and an 0.055 hour decrease for salaried physicians, or about 1.6 and 3.3 fewer minutes per month, respectively. Conversely, each percentage point increase in a physician's revenue from Medicaid is associated with a 0.0786 hour (4.7 minutes) increase for nonsalaried physicians and an 0.111 hour (6.7 minutes) increase for salaried physicians.

The constructs of ownership status, source of revenue, practice type, and site–year interactions were all found to be jointly significant for both salaried and nonsalaried physicians. In addition, the construct of potential years of practice was found to be significant for salaried physicians. Several other interesting associations were observed. Physician specialty is an important determinant of the amount of charity care provided, with general surgeons providing the most charity care among nonsalaried physicians, followed by emergency medicine and mental health specialists. Among salaried physicians, mental health specialists provide the most charity care, followed by surgical specialists. Female physicians provide the same amount of charity care per month as men and international medical graduates provide the same amount of charity care per month as U.S. educated physicians, regardless of salaried status.

Nonsalaried physicians working in medical schools and certain "other" practice settings provide significantly more charity care than physicians in solo or two-physician practices. While similar effects are observed among salaried physicians, doctors in this group also provide significantly more charity care if they work in a group HMO or are hospital based. Medical school–based physicians provide 4.4 hours more (nonsalaried) and 6 hours more (salaried) than physicians in solo or two-physician practices, and "other" practice-based physicians provide 2.5 hours more (nonsalaried) and 5.9 hours more (salaried) charity care than solo or two-physician practices.

Combining the first and second parts of the model, the expected hours of charity care an average nonsalaried physician will provide in a month is estimated at 5.6 hours, while the average salaried physician is expected to provide 6.1 hours of charity care per month. Unconditional marginal effects can also be calculated as shown in Table 4. The time trend indicates that from 1996 to 2005 salaried physicians have become significantly less likely to provide any charity care, but those who do provide charity care are providing roughly the same amount of charity care each year. Among nonsalaried physicians, no time trends are observed.

Table 4: Unconditional Marginal Effects of Select Variables for Observations at the Mean

	Change in Monthly Charity Care Provision	
Change in Variable of Interest	*Nonsalaried Physicians*	*Salaried Physicians*
Hourly wage (U.S.$10 increase)	5.7 minutes increase	51 minutes increase
Managed care revenue (10 percentage point increase)	13.8 minutes increase	24.5 minutes increase
Medicaid revenue (10 percentage point increase)	37.7 minutes increase	51.9 minutes increase
Full ownership of practice	1.6 hours increase	29.7 minutes increase
Part ownership of practice	40.4 minutes increase	2.7 minutes decrease
Work in a medical school (versus solo/2-physician practice)	3.9 hours increase	4.0 hours increase
Work in other practice settings (versus solo/2-physician practice)	1.4 hours increase	3.5 hours increase
General surgeons (versus "Other" physician specialties)	5.3 hours increase	Not significant
Surgical specialists (versus "Other" physician specialties)	1.8 hours increase	3.2 hours increase
Mental health specialists (versus "Other" physician specialties)	3.6 hours increase	3.6 hours increase

DISCUSSION

Confirming reports elsewhere in the literature, the findings from this study indicate that physicians are providing less charity care over time. This trend appears stronger in salaried physicians. The focus of this study—physician's hourly wage—is differentially associated with the likelihood of providing charity care depending on salaried status, though it is positively associated with the amount of charity care provided independent of salaried status. This suggests that physicians paid on salary think differently than nonsalaried physicians about their decision to provide charity care, but time and money become strong determinants for both groups of precisely how much charity care a physician is willing or able to provide. In both cases, however, physician specialty and practice setting are stronger determinants of charity care provision than is wage.

Indeed, the probability of providing any charity care is little affected, if at all, by the source of a physician's revenues or financial incentives that might influence treatment decisions. Rather, practice setting and practice ownership

appear to exert a much greater influence on a physician's decision to provide charity care. It makes intuitive sense that full owners and part owners possess more autonomy in their practice of medicine than do nonowners, which would explain their having the flexibility to provide charity care if they so choose. Similarly, the data support that physicians in practice settings other than solo or two-physician practices are likely to be subject to organizational-level constraints on their decision to provide charity care.

Turning our attention to the amount of charity care provided among those physicians who provide some charity care, practice ownership takes a back seat to practice setting. Such large effects could be explained by the types of charitable cases hospitals and health care organizations affiliated with a medical school take on out of both their obligation to the community and the emphasis on their role as a teaching institution. Similarly, this might explain why surgeons and mental health specialists are observed to provide more charity care than other specialists, because they tend to handle a greater proportion of emergent and nonelective cases compared with other physician generalists and specialists, and the nature of their work is more time intensive than other types of medical care.

Returning to the initial hypothesis that a higher hourly wage would make it less attractive to provide charity care, the reality as suggested by these data is that salaried and nonsalaried physicians face very different financial incentives. The negative coefficient on wage for nonsalaried physicians and the corresponding positive coefficient for salaried physicians in part 1 of the model strongly suggest that opportunity cost dominates decision making for nonsalaried physicians who can earn more by doing more noncharity work. For salaried physicians, more volume does not necessarily equate to greater pay. Therefore, opportunity cost is not likely to be a motivating factor in salaried physicians' decisions to provide charity care. In other words, as hourly wage increases, the decision to provide charity care becomes a more expensive one for nonsalaried physicians, but not for salaried physicians. An explanation for the positive wage coefficient for salaried physicians is straightforward. Here time would appear to be the limiting factor. Assuming two physicians, both receiving the same annual salary, the physician in this study with the higher hourly wage would be one who has more time available to provide charity care. Once the decision to provide charity care is made, a higher hourly wage is associated with the provision of more charity care regardless of salaried status. It seems likely that there is a certain income, which a physician wishes to earn annually to feel financially secure. Physicians who effectively earn a higher hourly wage would arguably reach that thresh-

old more quickly than those earning a lower wage, and they might therefore have more time remaining with which to provide charity care.

Additionally, personal motivations and other factors that affect the physician's practice arrangements appear to significantly influence behaviors regarding the provision of charity care, most likely because these factors constrain the physician's autonomy and simultaneously influence compensation. Therefore, future studies should seek to understand what factors determine a physician's threshold income, as well as what specific factors determine a physician's hourly wage, with consideration given to the implications of the findings on quality of care. Such research could lead to a better understanding of how physicians might optimally allocate their time.

LIMITATIONS

The study is limited by some assumptions in the construction of the hourly wage variable. Namely, it is assumed that the values reported for hours worked per week, hours of charity care per month, and weeks worked per year are not only accurate but also reflect the average workload of each physician. Checks on these variables to drop impossible values should minimize bias, and the large sample size should yield reasonable estimates on average, but this variable could be made stronger by redesigning the study question in future iterations of the CTS. Also, the top coding of income may have biased the coefficients on hourly wage toward zero. Consequently, the findings may underestimate the true association between hourly wage and charity care provision. However, only a small proportion (4.1 percent) of the sample was subject to top coding.

Hourly wage may be constructed in one of the following two ways: either including charity care hours in total hours worked or excluding charity care hours in total hours worked. If hourly wage is specified including charity care hours, there will be a very direct correlation between the key independent and the dependent variables, because as the hours of uncompensated charity care increase, the hourly wage would by definition decrease. This would bias the estimated coefficient on wage downward. On the other hand, if charity hours are backed out of the hourly wage calculation, then we are using a more accurate measure of what the physician earns for paid work to predict provision of charity care, which is what the study aims to do. However, if charity hours are measured with error (which is likely due to recall bias), then the coefficient on wage may still be biased somewhat. For example, if a

physician overreports the amount of charity care he/she provided, the dependent variable increases, while the hourly wage also increases (because pay remains the same but more uncompensated hours are subtracted out). In this case, we would expect that the bias would be upward.

To address this, I replicated all analyses using an alternate construction of the hourly wage variable in which charity care hours are not backed out. These results, shown in Tables A1 and A2, indicate that, while the coefficient on hourly wage is pulled downward in the unadjusted model, the primary construction of hourly wage (subtracting out charity care hours) in the adjusted model is preferred as the explanatory power of the unadjusted models is substantially lower. (Adjusted R^2 in the adjusted wage model is 0.074 for nonsalaried physicians and 0.163 for salaried physicians compared with unadjusted values of 0.058 and 0.087, respectively.)

Furthermore, the hourly wage variable may be endogenous. While I do control for the major sources of variation in physician wages (i.e., practice setting, practice ownership, source of revenue, and specialty), it is possible that there are unobserved characteristics of physicians associated with both wages and charity care, in which case the coefficient on hourly wage will be biased. If the omitted variable(s) are positively associated with wages and negatively associated with charity care provision, or vice versa, the coefficient on hourly wage will be biased downward. Conversely, if the omitted variable(s) are either positively or negatively correlated with both wages and charity care provision, the coefficient on hourly wage will be biased upward. While an instrumental variables approach is the preferred method for dealing with endogeneity, a strong and valid IV could not be identified without presenting problems of its own. For example, the first year of data could be used to generate an estimated wage variable for subsequent years, but this would discard a year's worth of data, which would amount to nearly one-third of the total sample given the smaller sample in round four of the CTS.

Also, because some physicians were repeatedly sampled over time, there is likely to be some physician-level clustering just as there is expected to be site-level clustering. While the current study controls for site-level clustering, it does not control for physician-level clustering, because not all physicians were sampled in all years. As a result, the estimated standard errors are likely to be biased downward, which introduces the possibility that the statistical significance of certain coefficients may be overstated.

The proportion of revenue from Medicaid variable was included to account for physicians' charitable "orientation" under the assumption that physicians who accepted Medicaid patients would be more likely to provide

charity care as well. However, it may be endogenous to the extent that it reflects physicians working in safety-net facilities such as community health centers or public hospitals. In either case, however, a physician has opted to treat a vulnerable population group, and the Medicaid variable should pick up this effect.

In addition, the inclusion of site–year interaction terms is an efficient way to control for site-specific time-varying unobserved heterogeneity, reducing bias in our parameter estimates of interest, but this method does little to inform what these unobserved factors might be or what effect each contributes. Future studies should consider merging in site-specific variables from other datasets to explore these factors in more detail.

CONCLUSION

With the recent enactment of health reform, which includes a mandate that all individuals have health insurance coverage that meets a minimum federal benefit standard, it is likely that the demand for charity care will decrease. However, many individuals will remain uninsured because they cannot afford coverage or do not wish to purchase it. In addition, millions of undocumented immigrants are excluded from the federal law's provisions. Consequently, the need for physicians to provide charity care will continue for the foreseeable future, raising an important policy question about how such charitable service can be fostered among physicians.

Based on the results of this study, it would seem that policies that encouraged physicians to be paid on a salaried rather than a nonsalaried basis, and which offered higher total compensation would lead to both an increased proportion of physicians providing charity care and a greater amount of total charity care provided. Furthermore, such policies could be targeted to achieve other aims of health reform. For example, increasing salaries for primary care physicians (but not specialists) while moving away from fee-for-service reimbursement has the potential to not only increase the amount of charity care they provide but also begin to address the shortage of primary care physicians in the health care workforce and restore the generalist to specialist ratio so often cited as a driver of high levels of health care spending in the United States. It is extremely important to note, however, that simply increasing physician incomes without a corresponding move toward paying more physicians on salary is likely to have a much smaller effect on the amount of charity care physicians provide.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Table A1. Results of Probit Model to Predict Probability of Providing Any Charity Care—Alternate Hourly Wage Specification (Includes Charity Hours)

Table A2. Physicians' Provision of Charity Care Conditional on Providing Any Charity Care—Alternate Hourly Wage Specification (Includes Charity Hours)